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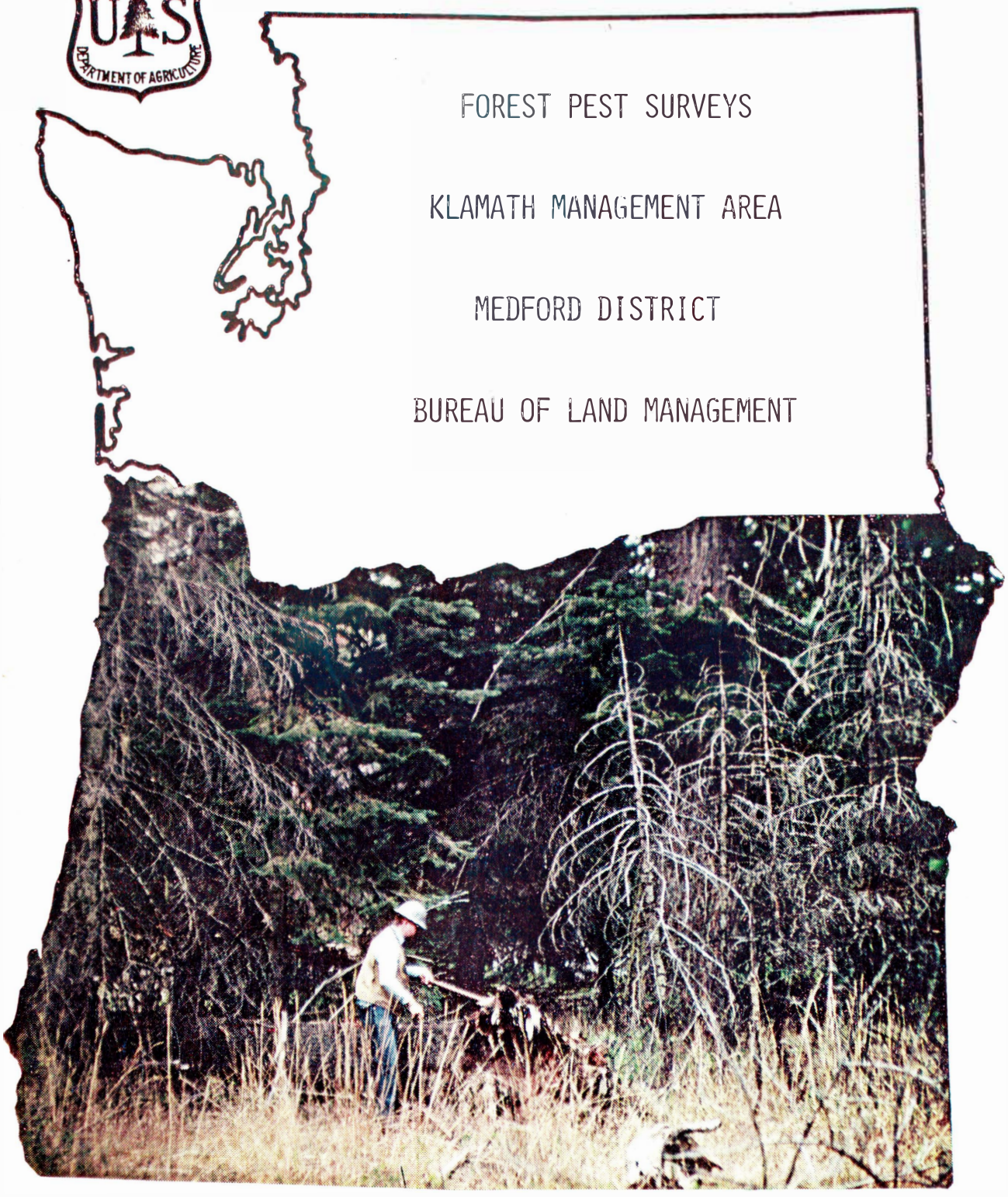
Forest Pest Management
Pacific Northwest Region

FOREST PEST SURVEYS

KLAMATH MANAGEMENT AREA

MEDFORD DISTRICT

BUREAU OF LAND MANAGEMENT



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Forest Pest Surveys, Klamath Management Area, Medford District, Bureau of Land Management

by

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INTRODUCTION

During the weeks of November 1-13, 1981, insect and disease surveys were done by the Forest Pest Management Pathology Group in 17 stands on the Klamath Resource Area, Medford District, Bureau of Land Management. Locations of the units surveyed are shown in Figure 1. Area personnel had identified these particular stands as having especially severe or difficult to manage pest problems. They requested evaluations to determine distribution and intensity of forest pests in the stands and provide recommendations for pest management.

METHODS

Each of the 17 units was surveyed systematically using a variable plot method. A Spiegel Relaskop was employed to define plots, and a basal area factor of 40 was used as a standard. Plots were located in the different stands on 2x2, 3x3, or 5x5 chain grids in such a fashion that there were 15 to 25 plots per unit. All trees within each plot were examined, and the following information was recorded: tree species, DBH, general condition (live, dead, standing, or down) and presence of disease or insect infestation. Two roots on opposite sides of each dead or symptomatic tree were excavated to a distance of 3 feet from the root collar and examined for evidence of root disease. Samples of stained or decayed wood from roots of recently dead or live symptomatic trees were returned to the laboratory for culturing. Roots and butts of old dead trees were dissected to determine the character of wood decay. Also, trunks were examined for signs and symptoms of heart rot, including conks and large wounds. Bark was removed from stems of bark beetle-infested trees to expose galleries for beetle species determination, and crowns of all trees were examined for signs and symptoms of such diseases as dwarf mistletoes and rusts. From the data collected in plots, mean basal area, number of trees, and volume per acre by tree species, DBH class, and tree condition were calculated for each stand.

RESULTS AND DISCUSSION

Stands surveyed in the Klamath Resource Area tended to be dominated by white fir (*Abies concolor*). Most also had a fairly large component of Douglas-fir (*Pseudotsuga menziesii*) and lesser amounts of ponderosa pine (*Pinus ponderosa*), sugar pine (*P. lambertiana*), Shasta red fir (*A. magnifica*), and/or incense cedar (*Libocedrus decurrens*). Most stands had a past history of selective harvest, and many looked quite decadent.

All stands exhibited pest-caused damage and several displayed very severe losses. Most damage was due to root diseases, by far the worst being laminated root rot caused by the fungus *Phellinus (Poria) weirii*. Major emphasis in pest management in the Klamath Area should be focused on this disease.

Laminated root rot is a particularly dangerous disease because of its devastating effects on the host and because the causal agent is persistent on the site. The fungus can survive for long time periods (up to 50 years) in roots of old stumps, infecting via root contacts new hosts that become established on the site. Infection centers develop and increase in size due to subsequent spread from tree to tree along roots. Infection usually results in death or windthrow of susceptible hosts.

Recommended control for laminated root rot is to cut all susceptible hosts in infection centers and a 50-foot buffer around each and either (1) mechanically remove all inoculum (infected roots and stumps) with heavy equipment, or (2) leave inoculum but replant with immune, resistant, tolerant, or intermediately susceptible tree species that are adapted to the site.

Choice of what type of control to use should be made on a site-by-site basis. Mechanical removal of inoculum is effective and allows the manager to replant with any tree species desired, but it is expensive, difficult on steep terrain, and may cause substantial soil damage. It should be considered for use only on relatively level areas with light soils and high site qualities. Tree species manipulation in disease centers is more universally applicable.

In the Klamath Resource Area, tree species by decreasing degree of susceptibility are: highly susceptible - Douglas-fir, white fir; intermediately susceptible - Shasta red fir; tolerant - sugar pine; resistant - ponderosa pine, incense cedar; immune - hardwoods. The least susceptible tree species that are adapted to a particular diseased site should be favored in species manipulation. If only immune tree species are grown for a rotation (50 years) on an infested site, *P. weirii* will die out, and a highly susceptible species such as Douglas-fir could be planted in the following rotation with almost no likelihood of additional losses. If resistant or tolerant species are used, there should be much the same result, although there may be a small amount of infection and retention of the pathogen. If intermediately susceptible species are grown for a rotation, they should suffer little damage, however, many will be infected, a few may die, and the disease will be maintained on the site. Planting Douglas-fir or white fir in the subsequent rotation would continue and probably intensify the problem.

In addition to laminated root rot, two other root diseases, annosus root rot and Armillaria root rot were also encountered with some frequency in the stands surveyed.

Fomes annosus, cause of annosus root rot, is spread by wind-borne spores. Fruiting bodies, usually formed in hollow stumps, produce large numbers of spores that can be dispersed over large areas. If spores land on freshly cut stump surfaces or recently created wounds, they germinate and the fungus colonizes the stump or tree. It then grows through the root system and hence across grafts and contacts into the roots of nearby healthy trees. Effects of infection depend very much on host species and fungus strain involved. In the Klamath Resource Area, only the strain of *F. annosus* that affects white fir appears to be significantly damaging. In areas where this fungus is active, it causes butt decay, decline, and some mortality of white fir. Disease management in severely infected stands involves favoring resistant tree species (anything other than white fir).

Armillaria mellea, cause of Armillaria root rot, survives as a saprophyte in old stumps and roots and can infect nearby trees across root contacts or by growing short distances through the soil. Usually *A. mellea* is a weak pathogen that infects and helps to kill stressed or injured trees. Occasionally, however, the fungus can be very virulent. The latter case is true of *A. mellea* on white and red fir on some sites in the Klamath Resource Area. Where this condition exists, disease management should involve either (1) tree species manipulation to favor resistance or (2) inoculum removal by excavating infected stumps.

Another important disease found in many of the surveyed stands was Douglas-fir dwarf mistletoe *(Arceuthobium douglasii)*. This disease causes tree distortion, top-kill, considerable growth loss, and some mortality. The pathogen, a parasitic higher plant, spreads by seeds that are forcibly discharged from infected overstories onto susceptible trees in the understory. Douglas-fir dwarf mistletoe only affects Douglas-fir. Recommended control for Douglas-fir dwarf mistletoe is to eliminate all infected Douglas-firs through harvest. The site can then either be regenerated with a nonhost or with Douglas-fir again. If Douglas-fir is used, the boundary of the unit must be free of Douglas-fir dwarf mistletoe-infected trees to prevent reinvasion. White fir dwarf mistletoe *(A. abietinum* f. sp. *concoloris)* was also common in surveyed stands, but this disease is seldom damaging if the infected trees have good live crown ratios.

There was little or no evidence of insect pests in the stands surveyed except for the fir engraver beetle *(Scolytus ventralis)* which was very common in root-diseased or severely injured white firs. Control of root diseases should limit occurrence of this insect.

Summary of Forest Pests

Stand Location	Legal Description	Hosts/Pests Present[1/]	Pest Severity
Poole Hill	T. 37 S., R. 3 E., sec. 6	WF-AM	Light
		WF-FA	Light
		DF-DM	Medium
Breast Mt.	T. 38 S., R. 2 E., sec. 3	WF-PW	Severe
		DF-PW	Severe
		WF-DM	Light
		DF-DM	Medium
Little Chinquipin Mt.	T. 39 S., R. 4 E., sec. 6	WF-PW	Severe
		DF-PW	Severe
Brush Mt. #1	T. 38 S., R. 4 E., sec. 32	WF-PW	Medium
		DF-PW	Medium
		WF-FA	Medium
		WF-SV	Severe
Brush Mt. #2	T. 38 S., R. 4 E., sec. 29	WF-PW	Severe
		DF-PW	Severe
Brush Mt. #3	T. 38 S., R. 4 E., sec. 35	WF-PW	Light
		DF-PW	Light
		DF-DM	Medium
Brush Mt. #4	T. 38 S., R. 4 E., sec. 26	WF-AM	Severe
		RF-AM	Severe
Brush Mt. #5	T. 38 S., R. 4 E., sec. 20	WF-PW	Severe
		DF-PW	Severe
Howard Prairie Reservoir #1	T. 38 S., R. 3 E., sec. 12	WF-AM	Medium
		DF-AM	Medium
		WF-FA	Light
		WF-DM	Light
		DF-DM	Light
		DF-CW	Light
Howard Prairie Reservoir #2	T. 38 S., R. 3 E., sec. 5	WF-PW	Moderate
		DF-PW	Moderate
		WF-AM	Light
		DF-DM	Severe
		WF-DM	Light
Howard Prairie Reservoir #3	T. 38 S., R. 3 E., sec. 25	WF-PW	Severe
		DF-PW	Severe
		WF-AM	Light
		WF-FA	Light
		WF-AD	Medium
		DF-AD	Medium

Summary of Forest Pests (Cont.)

Stand Location	Legal Description	Hosts/Pests Present	Pest Severity
Howard Prairie Reservoir #4	T. 38 S., R. 3 E., sec. 25	WF-PW	Severe
		DF-PW	Severe
		WF-AM	Light
		WF-FA	Light
		DF-DM	Severe
Howard Prairie Reservoir #5	T. 38 S., R. 3 E., sec. 35	WF-AM	Light
		WF-FA	Light
		DF-DM	Severe
		WF-DM	Medium
Howard Prairie Reservoir #6	T. 38 S., R. 3 E., sec. 35	WF-PW	Severe
		DF-PW	Severe
		DF-DM	Medium
		WF-DM	Medium
Hyatt Reservoir #1	T. 39 S., R. 3 E., sec. 1	WF-PW	Severe
		DF-PW	Severe
		WF-AM	Light
Hyatt Reservoir #2	T. 39 S., R. 3 E., sec. 21	WF-PW	Severe
		DF-PW	Severe
		WF-FA	Medium
		WF-DM	Medium
Grouse Butte	T. 39 S., R. 5 E., sec. 31	WF-PW	Severe
		DF-PW	Severe

1/Hosts: WF= white fir, DF = Douglas-fir, RF = Shasta red fir

Pests: PW = *Phellinus weirii*, AM = *Armillaria mellea*, FA = *Fomes annosus*, CW = *Ceratocystis wageneri*, DM = dwarf mistletoe, SV = *Scolytus ventralis*, AD = animal-caused damage

SITE-BY-SITE EVALUATIONS

The following are brief descriptions of conditions in each of the 17 units surveyed and specific pest management recommendations for each unit:

Stand 1

Location: Poole Hill (T. 37 S., R. 3 E., sec. 6).

Description: Fairly level site. This stand has had a recent selective harvest. The major component of the remaining stand is white fir; Douglas-fir and incense cedar occur in lesser amounts. Stand characteristics are summarized in Table 1.

Pest Conditions: There is a light amount of root disease of white fir, mainly in the southeast portion of the unit. Most is annosus root rot with some Armillaria root rot as well. Douglas-fir dwarf mistletoe occurs throughout the stand.

Pest Management Recommendations: (1) Remove dwarf mistletoe-infected overstory Douglas-fir at first opportunity; (2) no immediate action to control root diseases is recommended. However, in the long run, tree species that are resistant to annosus and Armillaria root rot (mistletoe-free Douglas-fir and incense cedar) should be favored over white fir in the southeast portion of the stand.

Stand 2

Location: Breast Mountain (T. 38 S., R. 2 E., sec. 3).

Description: Relatively uneven topography sloping down from the road. This stand has had past selective cutting and boundaries are laid out for additional harvest. Douglas-fir and white fir predominate in this stand, but there is a substantial component of incense cedar. Stand characteristics are summarized in Table 2.

Pest Conditions: There is severe laminated root rot in all but the northeast 1/3 of the stand. Both white fir and Douglas-fir are affected. Scattered Douglas-fir and white fir dwarf mistletoe occur throughout the stand.

Pest Management Recommendations: (1) During harvest remove Douglas-fir and white fir from southern and western portions of the stand. Consider leaving incense cedar as seed trees and interplanting incense cedar and/or ponderosa and sugar pine. If there is interest in replanting with sugar pine, the site should be evaluated for white pine blister rust infection hazard. If the evaluation indicates a high hazard site, use seedlings from resistant parents screened by the Dorena Tree Improvement Center. In future thinnings discriminate against naturally regenerating white fir and Douglas-fir; (2) during harvest remove dwarf mistletoe-infected Douglas-fir from northeast 1/3 of stand. White fir dwarf mistletoe can probably be ignored in this stand unless infections occur on the main stem or in the top of the crown.

Stand 3

Location: Little Chinquipin Mountain (T. 39 S., R. 4 E., sec. 6).

Description: Rolling terrain. This stand has had very recent cutting. A few thickets and scattered individual trees have been left, apparently for seed and shade. Residual trees are about equally divided among white fir, Douglas-fir, and incense cedar. There are also a few sugar pines. Characteristics of the residual stand are summarized in Table 3. Open areas in this unit have been planted with ponderosa pine and incense cedar.

Pest Conditions: Virtually the entire area shows evidence of severe laminated root rot in white fir and Douglas-fir. This is mostly evident in stumps (50% are infected) and remnants of old dead trees.

Pest Management Recommendations: Major effort has been made in this unit to prevent future loss to laminated root rot. Retention of incense cedar and sugar pine seed trees and interplanting with resistant seedlings are steps in the right direction. However, we recommend removal of all highly susceptible tree species (white fir and Douglas-fir) and replacement with resistant species. Susceptible species should also be discriminated against in future thinnings.

Stand 4

Location: Brush Mountain Number 1 (T. 38 S., R. 4 E., sec. 32).

Description: Relatively level terrain. Soil very rocky. The stand has had a recent heavy selection cut. The site is very much disturbed with soil churned up and many residual trees injured. Residual trees are mostly small white fir with a few Douglas-fir scattered through the stand. Characteristics of the residual stand are summarized in Table 4. Some small, relatively undisturbed patches of white fir in this stand have been thinned.

Pest Conditions: Light to moderate root rot in Douglas-fir and white fir is scattered throughout the stand. Both laminated root rot and annosus root rot were observed (the former on Douglas-fir and white fir, the latter on white fir only). Many very small trees and old stumps show evidence of disease. There is also a relatively high level of fir engraver beetle activity in both root-diseased and disease-free but injured white fir.

Pest Management Recommendations: This unit has many problems besides its pest problems and will present a challenge to the silviculturist. We recommend that the unit be clearcut and planted with ponderosa pine (an adjacent ponderosa pine plantation looks very good) or a mixture of ponderosa and sugar pine. If at all possible, such severe disturbance of soil and high level of tree wounding during harvest should be avoided in the future.

Stand 5

Location: Brush Mountain Number 2 (T. 38 S., R. 4 E., sec. 29).

Description: Level terrain but rather rocky soil. The stand was selectively harvested many years ago. It is heavily stocked and dominated by white fir though there is also a substantial component of Douglas-fir. A few very young ponderosa pines occur in the meadow located in the south center of this stand. Stand characteristics are summarized in Table 5.

Pest Conditions: There is severe laminated root rot on both white fir and Douglas-fir in discrete pockets in the southern 1/4 of this unit. The remainder of the area looks quite good.

Pest Management Recommendations: The laminated root rot pockets and a 50-foot buffer around each should be clearcut and replanted with ponderosa pine. This can either be done at the time of final stand harvest or immediately in combination with a commercial thinning or light selective harvest of the unit. The sooner the disease centers are treated, the less spread of the disease there will be into the surrounding stand.

Stand 6

Location: Brush Mountain Number 3 (T. 38 S., R. 4 E., sec. 35).

Description: Sloping terrain. The stand has had a past selective harvest and is marked for another. White fir is the dominant species but the stand has substantial components of Douglas-fir, incense cedar, and ponderosa pine, and a moderate amount of sugar pine. Characteristics of the stand are summarized in Table 6.

Pest Conditions: The stand has a relatively light amount of laminated root rot in white fir and Douglas-fir. The disease occurs in small discrete infection centers scattered through the stand. Douglas-fir dwarf mistletoe occurs at moderate levels.

Pest Management Recommendations: This stand has the advantage of having a good tree species mix. When stands of this type are to be harvested selectively, root disease-resistant species can be marked as leave trees within and around root disease centers. Seed from these trees will then contribute to natural regeneration of infection centers with resistant trees. In the Brush Mountain Number 3 unit, ponderosa pine, sugar pine, and incense cedar should be left in and around laminated root rot pockets; Douglas-fir and white fir should be removed. Also, all dwarf mistletoe-infected Douglas-fir should be harvested. The stand has already been marked with attainment of a reasonable degree of disease control in mind.

Stand 7

Location: Brush Mountain Number 4 (T. 38 S., R. 4 E., sec. 26).

Description: Rolling terrain and rocky soil. The stand is heavily stocked and is dominated by white fir. There are lesser components of Shasta red fir, Douglas-fir, and ponderosa pine. Stand characteristics are summarized in Table 7.

Pest Conditions: The stand has a high level of Armillaria root rot occurring in rather discrete infection centers. The disease is affecting both white and red fir of all vigor classes, indicating that the strain of the pathogen occurring on this site is quite virulent. Disease pockets are distributed throughout the stand.

Pest Management Recommendations: In combination with a commercial thinning or light selection cut, remove or destroy all true firs within Armillaria root rot pockets and a 50-foot buffer around each. Replant infection centers with Douglas-fir and/or ponderosa pine.

Stand 8

Location: Brush Mountain Number 5 (T. 38 S., R. 4 E., sec. 20).

Description: Terrain level. This unit was heavily cut over in the past and is now rather open and grassy. The residual stand is made up of about equal amounts of white fir and Douglas-fir. Stand characteristics are summarized in Table 8. Stump data indicate that the stand once had a substantial ponderosa pine component.

Pest Conditions: The stand has severe laminated root rot in white fir and Douglas-fir. The latter species exhibits evidence of disease mostly in stumps (31 percent of the Douglas-fir stumps have laminated decay). The root rot is distributed throughout the stand.

Pest Management Recommendations: Clearcut and plant ponderosa pine.

Stand 9

Location: Howard Prairie Reservoir Number 1 (T. 38 S., R. 3 E., sec. 12).

Description: Relatively level terrain with rocky soil. The stand has had a recent selective harvest and considerable site disturbance. Portions of the unit have been burned. The stand is dominated by white fir and Douglas-fir, but also has some incense cedar and a scattering of ponderosa pine. Stand characteristics are summarized in Table 9. There has been some underplanting with Douglas-fir in this unit.

Pest Conditions: Light to moderate Armillaria root rot of white fir and Douglas-fir occurs throughout the stand. Armillaria root rot appears to be associated with injuries and other factors (soil compaction, etc.) that have weakened trees. This stand also has lesser amounts of annosus root rot and dwarf mistletoe of both Douglas-fir and white fir. One small pocket of black stain root disease (caused by *Ceratocystis (Verticicladiella) wageneri*) was observed in the Douglas-fir understory.

Pest Management Recommendations: (1) Douglas-fir with dwarf mistletoe should be removed. Douglas-fir seedlings should not be planted beneath dwarf mistletoe-infected overstories unless the overstory trees are eliminated before the seedlings reach a height of 3 feet or an age of 10 years (whichever comes first); (2) root disease activity in this stand seems to be strongly related to site disturbance and tree injury caused by the timber harvest and subsequent burning. If at all possible, such drastic disturbance should be avoided in future treatments of similar sites in the area. In the current stand, any activities that will promote tree vigor will be helpful. These might include such activities as fertilization and, possibly, thinning in some of the heavily stocked patches of trees at the margins of the stand. Managers should recognize that there will probably be continuing tree mortality for several years in this stand.

Stand 10

Location: Howard Prairie Reservoir Number 2 (T. 38 S., R. 3 E., sec. 5).

Description: Fairly gentle slope. Shallow, rocky soil. The stand has had past selective cutting and is marked for a future seed tree cut. White fir is the predominant tree species with a substantial component of Douglas-fir. Stand characteristics are summarized in Table 10.

Pest Conditions: The stand has several active and discrete laminated root rot pockets in the southeast 1/4. Armillaria root rot occurs throughout the stand but at rather low levels. There is severe Douglas-fir dwarf mistletoe in the western half of the stand. White fir dwarf mistletoe is common but probably not very damaging.

Pest Management Recommendations: (1) Remove dwarf mistletoe-infected overstory Douglas-fir at first opportunity. If infected Douglas-fir are retained as seed trees, they should be removed before the new understory reaches 10 years old or 3 feet tall (whichever comes first); (2) during the upcoming cutting, all Douglas-fir and white fir in laminated root rot pockets and a 50-foot buffer around each should be harvested. Replant pockets with incense cedar.

Stand 11

Location: Howard Prairie Reservoir Number 3 (T. 38 S., R. 3 E., sec. 25, NW 1/4).

Description: Rolling terrain but fairly steep in places. The stand has had heavy selective harvests in the past. The major component of the residual stand is white fir with a substantial amount of incense cedar and scattered Douglas-fir and sugar pine. Characteristics of the residual stand are summarized in Table 11. Stump evidence suggests that the stand formerly contained more sugar pine and Douglas-fir than it does now. Some underplanting with Douglas-fir seedlings has been done in old skid trails.

Pest Conditions: Moderate to severe laminated root rot of white fir and Douglas-fir occurs throughout the stand. Much of the evidence of disease is in old stumps (13 percent are infected). Light annosus and Armillaria root rots of white fir are also scattered through the unit. There is considerable evidence of animal feeding damage in understory trees.

Pest Management Recommendations: Because of the wide distribution of inoculum, potential for future loss due to root rots in this stand is very great. We recommend harvesting all white fir and Douglas-fir and leaving incense cedar, sugar pine, and ponderosa pine as seed trees. During future thinnings, discriminate against any naturally regenerated white fir and Douglas-fir. If underplanting must be done, use a species resistant to laminated root rot such as incense cedar or ponderosa pine. To adequately regenerate this stand, some type of animal control may be required (main damaging animals appear to be pocket gophers, deer, and cattle).

Stand 12

Location: Howard Prairie Reservoir Number 4 (T 38 S., R. 3 E., sec. 25, SW 1/4).

Description: Relatively level. The stand has been selectively harvested in the past. The current stand is dominated by white fir, has a substantial component of Douglas-fir, and has some incense cedar and ponderosa pine. Characteristics of the stand are summarized in Table 12. Stump evidence indicates that originally this stand had considerably more Douglas-fir than it now does.

Pest Conditions: The stand has severe laminated root rot, especially in the southern 2/3. Douglas-fir and white fir are affected, and in addition to standing trees, 28 percent of the stumps show evidence of disease. There are also substantial amounts of Douglas-fir dwarf mistletoe and some annosus and Armillaria root rot in white fir.

Pest Management Recommendations: If not treated, this stand and future stands on this site will suffer substantial loss due to laminated root rot. Given the severity of disease on this site, the relatively level terrain, and the apparent site quality, stump removal with heavy equipment should be considered for root rot control, especially in the southern 2/3 of the area. If other considerations make stump removal unacceptable, we recommend that the unit be harvested and regenerated with ponderosa pine and incense cedar.

Stand 13

Location: Howard Prairie Reservoir Number 5 (T. 38 S., R. 3 E., sec. 35, NW 1/4 of NE 1/4).

Description: Steep hillside. The stand has had a heavy selective cut in the past and is marked for another. White fir and Douglas-fir are major components of the stand with some incense cedar and sugar pine. Stand characteristics are summarized in Table 13.

Pest Conditions: There is some evidence of annosus and Armillaria root rots in white fir stumps. Moderate to heavy Douglas-fir and white fir dwarf mistletoe occur throughout the stand.

Pest Management Recommendations: Leave trees marked for the next selection cut are mostly sugar pines, incense cedar, and mistletoe-free Douglas-firs. We do not foresee any significant disease problems in the future stand on this site with the possible exception of some white pine blister rust in sugar pine regeneration.

Stand 14.

Location: Howard Prairie Reservoir Number 6 (T. 38 S., R. 3 E., sec. 35, NE 1/4)

Description: Fairly level site with some slope between creek and road. The stand has had a past selective harvest. The major component of the residual stand is white fir with some Douglas-fir and incense cedar. Characteristics of the residual stand are summarized in Table 14. Stump data indicate that the stand formerly had a larger amount of Douglas-fir and also some sugar pine.

Pest Conditions: The stand has severe levels of laminated root rot in white fir and Douglas-fir. In the latter species, no residual trees exhibited infection, but 25 percent of the old stumps did. The disease is distributed throughout the stand. There is also dwarf mistletoe of Douglas-fir and white fir similarly distributed in the unit.

Pest Management Recommendations: Clearcut and regenerate with incense cedar, sugar pine, and ponderosa pine.

Stand 15

Location: Hyatt Reservoir Number 1 (T. 39 S., R. 3 E., sec. 1).

Description: Relatively steep hillside. No history of past harvest, but the stand is now marked for selective cut. The overstory is about equally divided among white fir, Douglas-fir, and incense cedar with some sugar pine. The understory is white fir. Stand characteristics are summarized in Table 15.

Pest Conditions: Severe laminated root rot of white fir and Douglas-fir occurs in the northern 1/5 of the stand. Light Armillaria root rot of white fir occurs throughout.

Pest Management Recommendations: In marking for the selective cut, tree species resistant to root disease have been singled out for leave trees. We heartily endorse this treatment for the unit and foresee few pest problems if this prescription is followed. However, a few Douglas-fir were marked to leave in the northern 1/5 of the stand where there is active laminated root rot. We suggest that these trees be removed. Douglas-fir leave trees should be safe in the remainder of the unit.

Stand 16

Location: Hyatt Reservoir Number 2 (T. 39 S., R. 3 E., sec. 21).

Description: Relatively level ground. The stand has had past selective cutting. The stand is dominated by white fir, especially in the north, it has a substantial component of Douglas-fir, and some incense cedar and sugar pine. Stand characteristics are summarized in Table 16.

Pest Conditions: There is very severe laminated root rot of Douglas-fir and white fir in the middle 1/3 of the stand and light to moderate annosus root rot of white fir throughout the unit. Moderate white fir dwarf mistletoe is distributed across the stand but is causing little damage.

Pest Management Recommendations: (1) The middle 1/3 of this stand has the worst laminated root rot encountered in this evaluation. An adjacent stand surveyed 2 years ago and subsequently treated had as bad a case of this disease as any reported in Oregon. Given the extreme severity of laminated root rot in the area, the gentle terrain, and the relatively high site quality, we recommend that the middle 1/3 of the unit be clearcut and the stumps be removed with heavy equipment. Old stumps as well as those created in the harvest will have to be excavated. The stand can then be regenerated with any tree species adapted to the site. If stump removal is impossible in the area, we recommend that all white fir and Douglas-fir be removed or destroyed, incense cedar be left as seed trees, and incense cedar, ponderosa pine, and sugar pine be interplanted; (2) in the northern and southern thirds of the stand, favor species other than white fir in future treatments (harvest, planting, thinning, etc.).

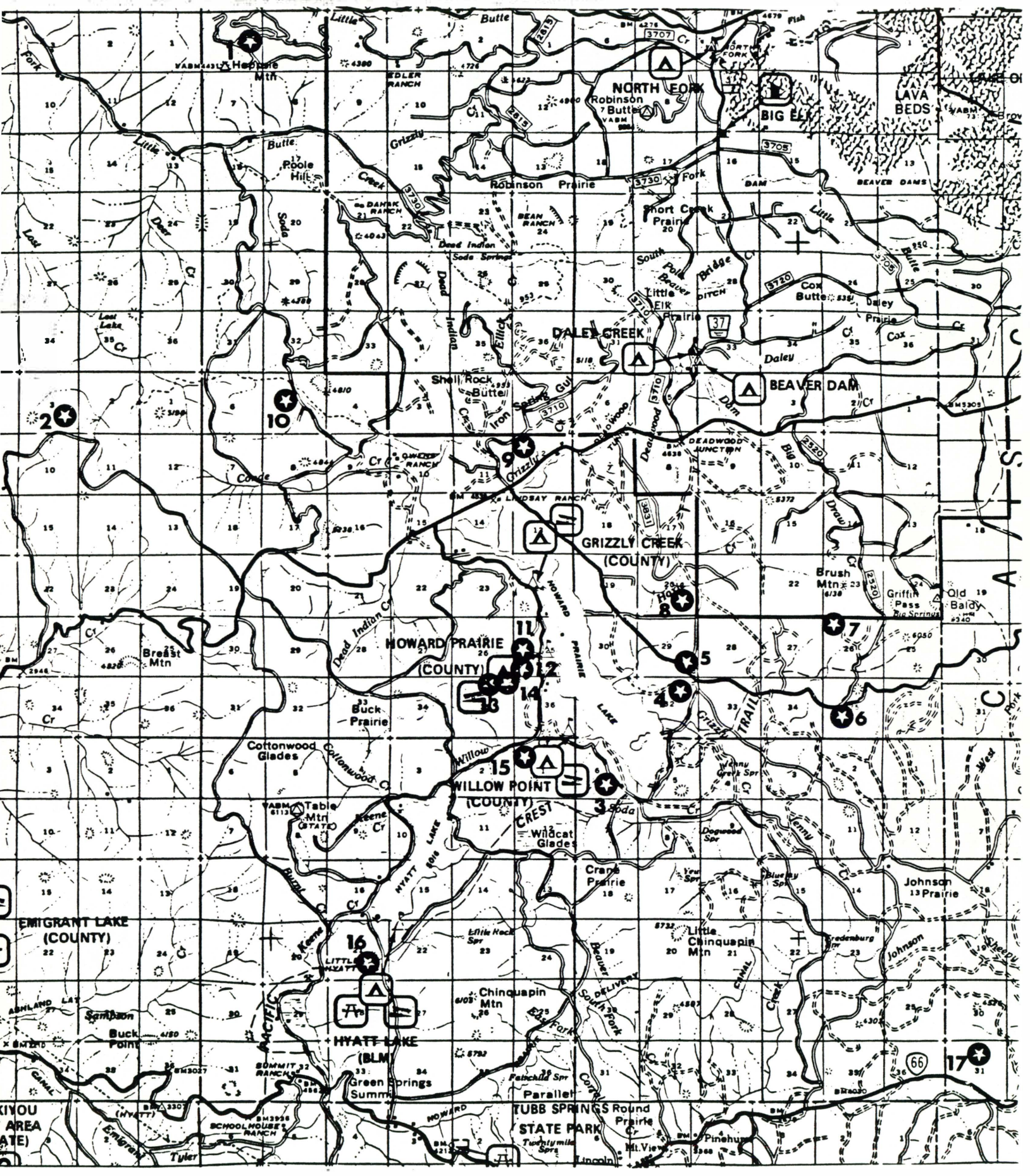
Stand 17

Location: Grouse Butte (T. 39 S., R. 5 E., sec. 31).

Description: Rolling terrain. The stand has had past selective harvest and is marked for another. Major components of the stand are white fir and Douglas-fir, but there are also substantial numbers of incense cedars and sugar pines as well as some ponderosa pines. Characteristics of the stand are summarized in Table 17.

Pest Conditions: Severe laminated root rot of white fir and Douglas-fir is distributed across the unit.

Pest Management Recommendations: In marking the stand for harvest, tree species resistant to laminated root rot have been selected as leave trees. If the stand is successfully regenerated with these species, there should be little potential for root disease loss in the next rotation on this unit.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BIG ELK
LAVA BEDS
DALEY CREEK
BEAVER DAM
GRIZZLY CREEK (COUNTY)
HOWARD PRAIRIE (COUNTY)
WILLOW POINT (COUNTY)
EMIGRANT LAKE (COUNTY)
HYATT LAKE (BLM)
TUBB SPRINGS STATE PARK
Robinson Prairie
Short Creek Prairie
Little Elk Prairie
Cox Butte
Daley Prairie
Shell Rock Butte
Poole Hill
Hoppie Mtn
Robinson Butte
Brush Mtn
Griffin Pass
Old Baldy
Breast Mtn
Buck Prairie
Cottonwood Glades
Wildcat Glades
Crane Prairie
Johnson Prairie
Little Chinquapin Mtn
Chinquapin Mtn
Buck Point
Green Springs Summit
Round Prairie
Pinehurst
Mt. View
Table Mtn
Keene Cr
Willow Creek
Cottonwood Cr
Dead Indian Cr
Howard Prairie Lake
Hyatt Lake
Deadwood Junction
Griffin Pass
Big Springs
Dogwood Spr
Blueberry Spr
Fatchild Spr
Twentymile Spr
Little Rock Spr
Parallel
Pacific
Crest
Trail
Canal
Creek
Fork
Dam
Draw
Ridge
Ditch
Delivery
Lake
Cr
Spr
Spring
Meadow
Prairie
Butte
Mtn
Hill
Ranch
Junction
Pass
Glades
Point
Lake
Summit
Schoolhouse
Tyler
Emigrant
Howard
Lincoln
Twentymile
Parallel
Fatchild
Little Rock
Blueberry
Dogwood
Willow
Cottonwood
Dead Indian
Howard Prairie
Hyatt Lake
Keene
Table Mtn
Buck Point
Green Springs
Summit
Schoolhouse
Tyler
Emigrant

Table 1.--Mean numbers of trees and bd. ft. volumes per acre by species, diameter, and condition, Poole Hill Unit

DBH Class	White Fir				Douglas-fir		Incense Cedar	
	Healthy		Root Diseased		Healthy		Healthy	
	Trees/Acre	Vol./Acre	Trees/Acre	Vol./Acre	Trees/Acre	Vol./Acre	Trees/Acre	Vol./Acre
6	26.0	0	0	0	0	0	0	0
8	21.2	620.6	7.2	208.8	7.2	151.2	0	0
10	13.8	565.8	0	0	4.6	174.8	0	0
12	6.4	531.2	0	0	3.2	224	0	0
14	2.4	288	2.3	276	0	0	0	0
16	1.8	251	1.8	261	0	0	3.6	514.8
18	1.4	415.8	0	0	0	0	0	0
20	0	0	0	0	2.3	828	0	0
22	0	0	0	0	0	0	0	0
24	2.3	1083.3	0	0	0	0	0	0
26	0	0	0	0	0	0	0	0
28	0	0	0	0	.6	445.8	0	0
30	0	0	0	0	.5	665	.5	374.5
32	0	0	0	0	0	0	0	0
34	0	0	0	0	0	0	.4	392
36	.3	501.9	0	0	0	0	0	0
38	0	0	0	0	0	0	0	0
40	0	0	0	0	0	0	0	0
42	0	0	0	0	.3	849.9	.3	640.8
44	0	0	0	0	.2	704.8	0	0
46	0	0	0	0	0	0	.4	974.8
48	0	0	0	0	0	0	.2	483
All Classes	75.8	4267.6	11.3	745.8	18.9	4043.5	5.4	3379.9

Table 2.--Mean numbers of trees and bd. ft. volumes per acre by species, diameter, and condition, Breast Mountain Unit

DBH Class	White Fir				Douglas-fir				Incense Cedar	
	Healthy		Root Diseased		Healthy		Root Diseased		Healthy	
	Trees/Ac.	Vol./Ac.	Trees/Ac.	Vol./Ac.	Trees/Ac.	Vol./Ac.	Trees/Ac.	Vol./Ac.	Trees/Ac.	Vol. Ac.
6	0	0	0	0	0	0	0	0	0	0
8	6.0	174.0	0	0	0	0	0	0	0	0
10	7.7	315.7	11.6	475.6	0	0	0	0	3.9	39.0
12	2.7	224.1	2.7	224.1	5.4	378.0	0	0	0	0
14	5.9	708.0	2.0	240.0	7.9	948.0	0	0	0	0
16	3.0	435.0	1.5	217.5	1.5	334.5	0	0	1.5	214.5
18	3.6	1069.2	2.4	712.8	2.4	624.0	0	0	1.2	288.0
20	1.9	769.5	0	0	1.0	360.0	0	0	1.9	452.2
22	1.6	648.0	0	0	0	0	0	0	0.8	132.0
24	0.7	329.7	0	0	3.4	2193.0	0	0	0.7	385.7
26	0.6	430.2	0	0	0.6	454.2	0	0	4.0	2580.0
28	0.5	443.7	0	0	1.0	743.0	0	0	1.5	1065.0
30	0	0	0	0	0.8	1064.0	0	0	0.4	299.6
32	0.4	512.4	0	0	0.4	567.6	0	0	0.4	331.2
34	0	0	0.3	559.5	1.3	2128.1	0	0	0	0
36	0.3	501.9	0	0	0	0	0	0	0	0
38	0	0	0	0	0	0	0.3	800.4	0.5	832.5
40	0	0	0	0	0.3	787.2	0.2	524.8	0	0
42	0.2	582.4	0	0	0	0	0	0	0.2	427.2
44	0	0	0	0	0	0	0	0	0	0
46	0	0	0	0	0	0	0	0	0	0
48	0	0	0	0	0.2	964.2	0	0	0	0
50	0	0	0	0	0.1	555.9	0	0	0	0
All Classes	35.1	7143.8	20.5	2429.5	26.3	12101.7	0.5	1325.2	17.0	7046.9

Table 3.--Mean numbers of trees and bd. ft. volumes per acre by species, diameter, and condition, Chinquapin Mountain Unit

DBH Class	White Fir				Douglas-fir		Incense Cedar		Sugar Pine	
	Healthy		Root Diseased		Healthy		Healthy		Healthy	
	Trees/Acre	Vol./Acre	Trees/Acre	Vol./Acre	Trees/Acre	Vol./Acre	Trees/Acre	Vol./Acre	Trees/Acre	Vol./Acre
6	0	0	0	0	0	0	0	0	0	0
8	0	0	0	0	0	0	0	0	0	0
10	7.3	299.3	0	0	0	0	0	0	0	0
12	0	0	5.1	423.3	10.2	714.0	5.1	280.5	0	0
14	0	0	0	0	3.7	444.0	0	0	0	0
16	0	0	2.9	420.5	2.9	646.7	0	0	0	0
18	0	0	0	0	2.3	598.0	0	0	0	0
20	0	0	0	0	0	0	1.8	428.4	1.8	714.6
22	0	0	1.5	622.5	1.5	789.0	0	0	0	0
24	0	0	0	0	0	0	0	0	0	0
26	0	0	0	0	0	0	0	0	0	0
28	0	0	0	0	0	0	0	0	0	0
30	0	0	0	0	0	0	0	0	0	0
32	0	0	0	0	0	0	0.7	579.6	0	0
34	0	0	0	0	0	0	0.6	588.0	0	0
All Classes	7.3	299.3	9.5	1466.3	20.6	3191.7	8.2	1876.5	1.8	714.6

Table 4.--Mean numbers of trees and bd. ft. volumes per acre by species, diameter, and condition, Brush Mountain Number 1 Unit

DBH Class	White Fir						Douglas-fir	
	Healthy		Root Diseased		Fir Engravers		Healthy	
	Trees/Acre	Vol./Acre	Trees/Acre	Vol./Acre	Trees/Acre	Vol./Acre	Trees/Acre	Vol./Acre
6	27.2	0	0	0	0	0	0	0
8	22.8	661.2	0	0	0	0	0	0
10	24.4	1000.4	0	0	0	0	0	0
12	3.4	282.2	0	0	6.8	564.4	0	0
14	0	0	0	0	2.5	300.0	0	0
16	3.8	551.0	0	0	0	0	1.9	423.7
18	0	0	0	0	0	0	0	0
20	0	0	0	0	1.2	486.0	0	0
22	1.0	415.0	0	0	0	0	0	0
24	0.9	423.9	0.8	376.8	0	0	0	0
26	1.4	1003.8	0	0	0	0	0.7	529.9
28	0	0	0.6	532.5	0	0	0	0
30	0	0	0.5	541.5	0	0	1.1	1463.0
32	0	0	0	0	0	0	0	0
34	0.4	746.0	0	0	0.4	746.0	0	0
36	0	0	0	0	0	0	0.7	1290.1
38	0	0	0	0	0	0	0.3	800.4
40	0	0	0	0	0	0	0.3	787.2
All Classes	85.3	5083.5	1.9	1450.8	10.9	2096.4	5.0	5294.3

Table 5.--Mean numbers of trees and bd. ft. volumes per acre by species, diameter, and condition, Brush Mountain Number 2 Unit

DBH Class	White Fir				Douglas-fir			
	Healthy		Root Diseased		Healthy		Root Diseased	
	Trees/Acre	Vol./Acre	Trees/Acre	Vol./Acre	Trees/Acre	Vol./Acre	Trees/Acre	Vol./Acre
6	43.7	0	0	0	0	0	0	0
8	16.4	475.6	8.2	237.8	0	0	0	0
10	26.2	1074.2	5.2	213.2	0	0	0	0
12	29.1	2415.3	10.9	904.7	3.7	259.0	3.6	252.0
14	29.4	3528.0	0	0	5.3	636.0	0	0
16	2.0	290.0	0	0	0	0	0	0
18	1.6	475.2	0	0	1.6	416.0	0	0
20	1.3	526.5	0	0	1.3	468.0	1.3	468.0
22	3.2	1328.0	0	0	2.1	1104.6	0	0
24	2.7	1271.7	0	0	0	0	0	0
26	0.8	573.6	0	0	0.8	605.6	0	0
28	0	0	0	0	0	0	0	0
30	1.2	649.8	0.6	649.8	0	0	0	0
32	0.5	640.5	0	0	1.0	1419.0	0.5	709.5
34	0.9	1678.5	0	0	0	0	0	0
36	0	0	0	0	0.8	1474.4	0	0
38	0	0	0	0	0	0	0	0
40	0	0	0	0	0.3	787.2	0	0
42	0	0	0	0	0.3	849.9	0	0
44	0	0	0	0	0.5	1762.0	0	0
46	0	0	0	0	0	0	0	0
48	0	0	0	0	0.9	4338.9	0	0
50	0	0	0	0	0	0	0	0
52	0	0	0	0	0	0	0	0
54	0	0	0	0	0	0	0	0
54+	0	0	0.1	830.0	0.1	827.9	0	0
All Classes	226.7	14926.9	25.0	2835.5	18.7	14948.5	5.4	1429.5

Table 6.—Mean numbers of trees and bd. ft. volumes per acre by species, diameter, and condition, Brush Mountain Number 3 Unit

DBH	White Fir				Douglas-fir				Incense Cedar		Sugar Pine		Ponderosa Pine	
	Healthy		Root Diseased		Healthy		Root Diseased		Healthy		Healthy		Healthy	
Class	Trees/Acre	Vol./Acre	Trees/Acre	Vol./Acre	Trees/Acre	Vol./Acre	Trees/Acre	Vol./Acre	Trees/Acre	Vol./Acre	Trees/Acre	Vol./Acre	Trees/Acre	Vol./Acre
6	11.3	0	11.3	0	0	0	0	0	11.3	0	0	0	0	0
8	25.4	736.6	6.4	185.6	12.7	266.7	0	0	0	0	0	0	0	0
10	12.2	500.2	4.1	168.1	8.1	307.8	0	0	4.1	82.0	0	0	8.1	729.8
12	11.3	937.9	0	0	2.7	189.0	5.7	399.0	2.8	154.0	0	0	2.8	337.7
14	4.1	492.0	0	0	0	0	0	0	4.1	270.6	0	0	0	0
16	3.2	464.0	0	0	0	0	0	0	3.2	457.6	1.6	356.8	0	0
18	1.3	386.1	0	0	0	0	0	0	0	0	0	0	0	0
20	3.0	1215.0	0	0	0	0	0	0	0	0	0	0	0	0
22	0.8	332.0	0	0	0.8	420.8	0	0	0.8	132.0	0	0	0	0
24	0	0	0	0	0.7	451.5	0	0	0.7	270.0	0	0	0	0
26	0.6	430.2	0	0	0	0	0.6	454.2	0	0	0	0	0.6	435.0
28	0	0	0	0	0	0	0	0	0	0	0	0	0	0
30	0	0	0	0	0	0	0	0	0	0	0	0	0	0
32	0.4	512.4	0	0	0	0	0	0	0	0	0.8	1135.2	0	0
34	0	0	0	0	0.4	654.8	0	0	0.4	392.0	0	0	0	0
36	0	0	0	0	0.3	552.9	0	0	0.3	449.1	0	0	0.4	737.2
38	0	0	0	0	0.6	1600.8	0	0	0	0	0.3	710.4	0	0
40	0	0	0	0	0.3	787.2	0	0	0.3	473.1	0	0	0	0
42	0	0	0	0	0	0	0	0	0	0	0	0	0	0
44	0	0	0	0	0	0	0	0	0	0	0.3	1057.2	0	0
46	0	0	0	0	0	0	0	0	0	0	0	0	0	0
48	0	0	0	0	0	0	0	0	0	0	0.2	964.2	0	0
50	0	0	0	0	0	0	0	0	0	0	0.1	471.5	0	0
52	0	0	0	0	0	0	0	0	0	0	0	0	0	0
54	0	0	0	0	0	0	0	0	0	0	0	0	0	0
54+	0	0	0	0	0	0	0	0	0.1	491.6	0	0	0.1	714.4
All Classes	73.7	6006.4	21.8	353.7	26.6	6084.7	6.3	853.2	28.1	3172.0	3.3	4695.3	12.0	2954.1

Table 7.—Mean numbers of trees and bd. ft. volumes per acre by species, diameter, and condition, Brush Mountain Number 4 Unit

DBH Class	White Fir				Red Fir				Douglas-fir		Ponderosa Pine	
	Healthy		Root Diseased		Healthy		Root Diseased		Healthy		Healthy	
	Trees/Acre	Vol./Acre	Trees/Acre	Vol./Acre	Trees/Acre	Vol./Acre	Trees/Acre	Vol./Acre	Trees/Acre	Vol./Acre	Trees/Acre	Vol./Acre
6	0	0	0	0	0	0	0	0	0	0	0	0
8	32.7	948.3	0	0	0	0	0	0	0	0	0	0
10	10.5	430.5	7.0	287.0	7.0	297.5	3.5	133.0	0	0	0	0
12	9.7	605.1	4.8	398.4	0	0	0	0	2.4	168.0	0	0
14	16.0	1920.0	3.6	432.0	0	0	0	0	0	0	0	0
16	23.2	3364.0	4.1	594.5	4.1	914.3	0	0	0	0	1.4	263.2
18	10.7	2700.6	2.2	653.4	0	0	0	0	1.1	326.7	0	0
20	16.6	6723.0	1.7	688.5	0	0	0.9	324.0	0	0	0	0
22	10.1	4191.5	0.7	290.5	0	0	0	0	0	0	0	0
24	4.9	2307.9	0.6	282.6	0	0	0	0	0	0	0	0
26	0.5	358.5	0	0	0	0	0	0	0	0	0	0
28	0.4	355.0	0	0	0	0	0	0	0	0	0	0
30	0.4	433.2	0	0	0	0	0	0	0	0	0	0
32	0.7	896.7	0	0	0	0	0	0	0	0	0	0
All Classes	136.4	25434.3	24.7	3626.9	11.1	1211.8	4.4	457.0	3.5	494.7	1.4	263.2

Table 8.--Mean numbers of trees and bd. ft. volumes per acre by species, diameter, and condition, Brush Mountain Number 5 Unit

DBH Class	White Fir				Douglas-fir			
	Healthy		Root Diseased		Healthy		Root Diseased	
	Trees/Acre	Vol./Acre	Trees/Acre	Vol./Acre	Trees/Acre	Vol./Acre	Trees/Acre	Vol./Acre
6	0	0	0	0	0	0	0	0
8	0	0	0	0	9.5	199.5	0	0
10	0	0	0	0	0	0	0	0
12	4.2	348.6	0	0	0	0	0	0
14	3.1	372.0	3.1	372.0	6.2	744.0	0	0
16	4.8	696.0	2.4	348.0	2.4	535.2	0	0
18	1.9	564.3	3.8	1128.6	0	0	0	0
20	0	0	0	0	0	0	0	0
22	1.3	539.5	0	0	1.3	683.8	0	0
24	0	0	1.1	518.1	1.1	709.5	0	0
26	0	0	0	0	0.9	681.3	0	0
28	0	0	0	0	0.8	594.4	0	0
30	0	0	0	0	0	0	0	0
32	0	0	0	0	0	0	0	0
34	0	0	0	0	0	0	0	0
36	0	0	0	0	0	0	0	0
38	0	0	0	0	0	0	0	0
40	0	0	0	0	0	0	0	0
42	0	0	0	0	0	0	0	0
44	0	0	0	0	0	0	0	0
46	0	0	0	0	0	0	0	0
48	0	0	0	0	0	0	0.3	1446.3
All Classes	15.3	2520.4	10.4	2366.7	25.4	4147.7	0.3	1446.3

Table 9.—Mean numbers of trees and bd. ft. volumes per acre by species, diameter, and condition, Howard Prairie Reservoir Number 1 Unit

DBH	White Fir				Douglas-fir				Ponderosa Pine		Incense Cedar	
	Healthy		Root Diseased		Healthy		Root Diseased		Healthy		Healthy	
Class	Trees/Acre	Vol./Acre	Trees/Acre	Vol./Acre	Trees/Acre	Vol./Acre	Trees/Acre	Vol./Acre	Trees/Acre	Vol./Acre	Trees/Acre	Vol./Acre
6	20.4	0	0	0	10.2	0	0	0	0	0	0	0
8	11.5	333.5	0	0	11.5	241.5	0	0	0	0	0	0
10	11.0	451.0	0	0	0	0	0	0	0	0	0	0
12	12.7	1054.1	0	0	2.5	175.0	0	0	0	0	0	0
14	0	0	1.9	228.0	0	0	0	0	0	0	0	0
16	1.4	312.2	0	0	1.4	312.2	0	0	0	0	0	0
18	2.2	286.0	0	0	1.1	286.0	0	0	0	0	0	0
20	2.8	1134.0	0.9	364.5	0	0	0	0	0	0	0.9	214.2
22	1.5	622.5	0	0	1.5	789.0	0	0	0	0	0	0
24	0	0	0	0	0	0	0	0	0.6	226.1	0	0
26	0	0	0	0	1.1	832.7	0	0	0	0	0	0
28	0	0	0	0	0.5	371.5	0	0	0	0	0	0
30	0.4	433.2	0	0	0.4	532.0	0	0	0	0	0.4	299.6
32	0	0	0.4	512.4	1.4	1986.6	0.4	567.6	0	0	0.8	1135.2
34	0	0	0	0	0.9	1473.3	0	0	0	0	0	0
36	0.3	501.9	0	0	0.3	552.9	0	0	0	0	0	0
38	0	0	0	0	0	0	0	0	0	0	0	0
40	0	0	0	0	0.2	524.8	0	0	0	0	0	0
42	0	0	0	0	0.2	566.6	0	0	0	0	0	0
44	0	0	0	0	0	0	0.2	704.8	0	0	0	0
All Classes	64.2	5386.6	3.2	1104.9	33.2	8644.1	0.6	1272.4	0.6	226.1	2.1	1649.0

Table 10.—Mean numbers of trees and bd. ft. volumes per acre by species, diameter, and condition, Howard Prairie Reservoir Number 2 Unit

DBH Class	White Fir				Douglas-fir			
	Healthy		Root Diseased		Healthy		Root Diseased	
	Trees/Acre	Vol./Acre	Trees/Acre	Vol./Acre	Trees/Acre	Vol./Acre	Trees/Acre	Vol./Acre
6	9.3	0	0	0	0	0	0	0
8	5.2	150.8	0	0	0	0	0	0
10	3.4	139.4	3.3	135.3	0	0	0	0
12	0	0	4.6	381.8	4.6	322.0	0	0
14	6.8	816.0	0	0	0	0	0	0
16	5.2	754.0	1.3	188.5	1.3	289.9	0	0
18	4.1	1217.7	1.0	297.0	1.0	260.0	0	0
20	4.9	1984.5	0	0	1.6	576.0	0	0
22	0.7	290.5	0	0	0.7	368.2	0	0
24	1.1	518.1	1.2	565.2	0	0	0.6	387.0
26	2.0	1434.0	0	0	0	0	0	0
28	2.1	1863.7	0	0	0.4	743.0	0	0
30	1.5	1624.5	0	0	0	0	0	0
32	1.3	1665.3	0	0	0	0	0	0
34	0.6	1119.0	0	0	0.3	196.4	0	0
36	0.3	501.9	0	0	0.8	1474.4	0	0
38	0.5	1031.0	0	0	0.7	1867.6	0.2	533.6
40	0	0	0.2	484.4	0.4	1049.6	0	0
42	0.4	1164.8	0	0	0.4	1133.2	0	0
44	0	0	0	0	0.5	1762.0	0.2	704.8
46	0	0	0	0	0.6	2726.4	0	0
48	0	0	0	0	0	0	0	0
50	0	0	0	0	0	0	0	0
50+	0	0	0	0	0.1	2031.9	0.1	763.6
All Classes	49.4	16275.2	11.6	2052.2	13.6	14800.6	1.1	2389.0

Table 11.--Mean numbers of trees and bd. ft. volumes per acre by species, diameter, and condition, Howard Prairie Reservoir Number 3 Unit

DBH Class	White Fir				Douglas-fir		Incense Cedar		Sugar Pine	
	Healthy		Root Diseased		Healthy		Healthy		Healthy	
	Trees/Acre	Vol./Acre	Trees/Acre	Vol./Acre	Trees/Acre	Vol./Acre	Trees/Acre	Vol./Acre	Trees/Acre	Vol./Acre
6	0	0	0	0	0	0	0	0	0	0
8	22.9	664.1	0	0	0	0	0	0	0	0
10	3.7	151.7	0	0	0	0	3.7	74.0	0	0
12	5.1	423.3	0	0	0	0	0	0	0	0
14	3.7	444.0	0	0	0	0	0	0	0	0
16	5.8	841.0	1.4	203.0	0	0	2.8	400.4	0	0
18	3.4	1009.8	0	0	0	0	1.1	264.0	0	0
20	2.5	1012.5	0	0	0	0	0.8	190.4	0	0
22	3.0	1245.0	0	0	0	0	0	0	0	0
24	1.2	565.2	1.3	612.3	0	0	0.6	330.6	0	0
26	1.1	788.7	0	0	0	0	1.1	709.5	0	0
28	1.8	1597.5	0.5	443.7	0	0	0.9	639.0	0	0
30	1.2	1299.6	0.4	433.2	0	0	0	0	0	0
32	1.1	1409.1	0	0	0	0	0.4	331.2	0.4	567.6
34	0	0	0	0	0	0	0	0	0	0
36	0	0	0	0	0	0	0.3	449.1	0	0
38	0	0	0	0	0	0	0	0	0	0
40	0	0	0	0	0.2	524.8	0	0	0	0
All Classes	56.5	11451.5	3.6	1692.2	0.2	524.8	11.7	3388.2	0.4	567.6

Table 12.—Mean numbers of trees and bd. ft. volumes per acre by species, diameter, and condition, Howard Prairie Reservoir Number 4 Unit

DBH	White Fir				Douglas-fir				Incense Cedar		Ponderosa Pine	
	Healthy		Root Diseased		Healthy		Root Diseased		Healthy		Healthy	
Class	Trees/Acre	Vol./Acre	Trees/Acre	Vol./Acre	Trees/Acre	Vol./Acre	Trees/Acre	Vol./Acre	Trees/Acre	Vol./Acre	Trees/Acre	Vol./Acre
6	14.6	0	0	0	0	0	0	0	0	0	0	0
8	8.2	237.8	0	0	0	0	0	0	0	0	0	0
10	10.5	1201.5	20.9	856.9	0	0	0	0	0	0	0	0
12	3.7	307.1	3.6	298.8	0	0	0	0	0	0	0	0
14	13.4	1608.0	0	0	0	0	0	0	0	0	0	0
16	2.1	304.5	2.0	290.0	4.1	914.3	0	0	0	0	0	0
18	3.3	980.1	1.6	475.2	1.6	416.0	0	0	0	0	0	0
20	2.6	1053.0	1.3	526.5	1.3	361.3	0	0	0	0	0	0
22	1.1	456.5	1.1	456.5	0	0	1.1	578.6	1.1	181.5	1.1	418.0
24	1.8	847.8	0	0	0.9	580.5	0	0	0	0	0	0
26	1.6	1147.2	0	0	0	0	0	0	0	0	0	0
28	2.0	1775.0	0.7	621.2	0	0	0	0	0	0	0	0
30	2.3	2490.9	0	0	0	0	0	0	0	0	0	0
32	2.0	2562.0	0	0	0	0	0	0	0	0	0	0
34	1.4	2611.0	0.4	746.0	0	0	0	0	0	0	0	0
36	0	0	0	0	0	0	0	0	0	0	0	0
38	1.8	3711.6	0	0	0	0	0	0	0	0	0	0
40	0.3	726.6	0	0	0	0	0	0	0	0	0	0
42	0	0	0	0	0	0	0	0	0	0	0	0
44	0.5	1665.0	0	0	0	0	0	0	0	0	0	0
46	0.2	803.8	0	0	0	0	0	0	0	0	0	0
48	0.4	1986.8	0	0	0	0	0	0	0	0	0	0
50	0	0	0.2	943.0	0.2	1111.8	0	0	0	0	0	0
52	0	0	0	0	0	0	0	0	0	0	0	0
54	0	0	0	0	0	0	0	0	0	0	0	0
54+	0	0	0	0	0.2	1681.8	0	0	0	0	0	0
All Classes	72.7	25812.0	32.9	7238.4	8.3	5065.8	1.1	578.6	1.1	181.5	1.1	418.0

Table 13.--Mean numbers of trees and bd. ft. volume per acre by species, diameter, and condition, Howard Prairie Reservoir Number 5 Unit

DBH Class	White Fir		Douglas-fir		Sugar Pine		Incense Cedar	
	Healthy		Healthy		Healthy		Healthy	
	Trees/Acre	Vol./Acre	Trees/Acre	Vol./Acre	Trees/Acre	Vol./Acre	Trees/Acre	Vol./Acre
6	0	0	0	0	0	0	0	0
8	9.5	275.5	0	0	0	0	0	0
10	24.4	1000.4	0	0	0	0	0	0
12	4.2	348.6	0	0	0	0	0	0
14	9.3	1116.0	0	0	0	0	0	0
16	7.2	1044.0	0	0	0	0	0	0
18	1.9	564.3	0	0	0	0	0	0
20	1.5	607.5	0	0	0	0	0	0
22	2.5	1037.5	1.3	683.8	0	0	0	0
24	2.1	989.1	1.1	709.5	0	0	0	0
26	0.9	645.3	0.9	681.3	0	0	1.8	1161.0
28	0.8	710.0	0.8	594.4	0	0	0.8	568.0
30	0.7	758.1	2.0	2660.0	0	0	0	0
32	0	0	0	0	0	0	0	0
34	0	0	0.5	818.5	0	0	0	0
36	0	0	0	0	0	0	0	0
38	0	0	0	0	0	0	0.4	666.0
40	0	0	0.4	1049.6	0	0	0	0
42	0	0	0	0	0.3	1200.0	0	0
44	0	0	0	0	0	0	0	0
46	0	0	0.3	1363.2	0	0	0	0
48	0	0	0.3	1446.3	0	0	0	0
50	0	0	0	0	0	0	0	0
52	0	0	0	0	0.2	559.6	0	0
All Classes	65.0	9096.3	7.6	10006.6	0.5	1759.6	3.0	2395.0

Table 14.—Mean numbers of trees and bd. ft. volumes per acre by species, diameter, and condition, Howard Prairie Reservoir Number 6 Unit

DBH Class	White Fir				Douglas-fir		Incense Cedar	
	Healthy		Root Diseased		Healthy		Healthy	
	Trees/Acre	Vol./Acre	Trees/Acre	Vol./Acre	Trees/Acre	Vol./Acre	Trees/Acre	Vol./Acre
6	34.0	0	0	0	0	0	0	0
8	9.6	278.4	9.5	275.5	0	0	0	0
10	6.1	250.1	0	0	0	0	0	0
12	4.2	348.6	4.2	348.6	0	0	4.2	231.0
14	3.1	372.0	3.1	372.0	0	0	0	0
16	7.2	1044.0	2.4	348.0	0	0	0	0
18	3.8	1128.6	0	0	3.8	988.0	0	0
20	3.1	1255.5	0	0	0	0	0	0
22	2.5	1037.5	0	0	0	0	0	0
24	0	0	0	0	1.1	709.5	0	0
26	0.9	645.3	0	0	2.7	2043.9	0	0
28	1.6	1420.0	0	0	2.4	1783.2	0.8	568.0
30	0	0	0	0	0.7	931.0	0	0
32	0	0	0	0	1.2	1702.8	0	0
34	0	0	0	0	0.5	818.5	0.5	490.0
36	0	0	0	0	0.9	1658.7	0	0
38	0	0	0	0	0	0	0	0
40	0.4	968.8	0.4	968.8	0	0	0	0
42	0	0	0	0	0	0	0	0
44	0.3	999.0	0	0	0	0	0	0
All Classes	76.8	9747.8	19.6	2312.9	13.3	10635.6	5.5	1289.0

Table 15.—Mean numbers of trees and bd. ft. volumes per acre by species, diameter, and condition, Hyatt Reservoir Number 1 Unit

DBH Class	White Fir				Douglas-fir				Incense Cedar		Sugar Pine	
	Healthy		Root Diseased		Healthy		Root Diseased		Healthy		Healthy	
	Trees/Acre	Vol./Acre	Trees/Acre	Vol./Acre	Trees/Acre	Vol./Acre	Trees/Acre	Vol./Acre	Trees/Acre	Vol./Acre	Trees/Acre	Vol./Acre
6	38.3	0	0	0	0	0	0	0	0	0	0	0
8	28.6	829.4	0	0	0	0	0	0	0	0	0	0
10	4.6	188.6	0	0	0	0	0	0	0	0	0	0
12	12.7	1054.1	3.2	265.6	0	0	0	0	6.4	352.0	0	0
14	7.0	840.0	0	0	0	0	0	0	0	0	0	0
16	1.8	261.0	0	0	0	0	0	0	0	0	0	0
18	2.8	831.6	0	0	0	0	0	0	0	0	0	0
20	3.5	1417.5	1.1	445.5	0	0	0	0	1.1	261.8	0	0
22	1.0	415.0	0.9	373.5	0	0	0	0	0	0	0	0
24	3.2	1507.2	0.8	376.8	1.6	1032.0	0	0	0.8	440.8	0	0
26	2.7	1935.9	0.7	501.9	0	0	0	0	0	0	0.7	455.7
28	1.2	1065.0	2.3	2041.2	0.6	445.8	0	0	0	0	0	0
30	1.5	1624.5	0.5	541.5	0.5	665.0	0	0	0.5	374.5	0	0
32	0.4	512.4	0	0	0	0	0	0	0.4	331.2	0	0
34	2.0	3730.0	0.4	746.0	0.4	654.8	0	0	0.4	392.0	0	0
36	0.4	669.2	0	0	0	0	0	0	0.4	598.8	0	0
38	0.6	742.3	0	0	0.6	1600.8	0	0	0.3	499.5	0.3	710.4
40	0	0	0	0	0.3	787.2	0	0	0	0	0	0
42	0	0	0	0	0.5	1416.5	0	0	0	0	0	0
44	0	0	0	0	0	0	0	0	0	0	0	0
46	0	0	0	0	0.4	1817.6	0	0	0	0	0	0
48	0	0	0	0	0	0	0	0	0.2	483.0	0	0
50	0	0	0	0	0	0	0.2	1111.8	0	0	0	0
52	0	0	0	0	0	0	0	0	0	0	0	0
54	0	0	0	0	0.2	1425.8	0	0	0	0	0	0
54+	0	0	0	0	0.3	2597.8	0.1	1141.5	0	0	0	0
All Classes	112.3	17623.7	9.9	5292.0	5.4	12443.3	0.3	2253.3	10.5	3733.6	1.0	1166.1

Table 16.—Mean numbers of trees and bd. ft. volumes per acre by species, diameter, and condition, Hyatt Reservoir Number 2 Unit

DBH Class	White Fir				Douglas-fir				Incense Cedar		Sugar Pine	
	Healthy		Root Diseased		Healthy		Root Diseased		Healthy		Healthy	
	Trees/Acre	Vol./Acre	Trees/Acre	Vol./Acre	Trees/Acre	Vol./Acre	Trees/Acre	Vol./Acre	Trees/Acre	Vol./Acre	Trees/Acre	Vol./Acre
6	7.1	0	7.0	0	0	0	0	0	0	0	0	0
8	19.7	571.3	7.9	229.1	0	0	0	0	0	0	0	0
10	2.5	102.5	0	0	0	0	0	0	0	0	0	0
12	12.3	1020.9	0	0	0	0	0	0	0	0	0	0
14	3.8	456.0	5.2	624.0	2.6	312.0	0	0	0	0	1.3	132.6
16	3.0	435.0	1.0	145.0	3.0	669.0	0	0	0	0	0	0
18	4.7	1395.9	3.1	920.7	2.3	598.0	0	0	0	0	0	0
20	1.9	769.5	0	0	0	0	0	0	0	0	0	0
22	1.6	664.0	2.1	871.5	0	0	0	0	0	0	0	0
24	1.8	847.8	0.4	188.4	0.4	188.4	0	0	0	0	0	0
26	2.3	1649.1	1.1	788.7	0	0	0	0	0	0	0	0
28	1.6	1420.0	0.3	266.2	0.3	266.2	0	0	0	0	0	0
30	0.8	866.4	0	0	0	0	0.3	399.0	0	0	0	0
32	0.5	640.5	0.2	256.2	0.2	283.8	0	0	0	0	0	0
34	0.9	1678.5	0	0	0	0	0	0	0.2	196.0	0	0
36	0.4	669.2	0	0	0.2	368.6	0	0	0	0	0	0
38	0.4	824.9	0.1	206.1	0	0	0.1	266.8	0	0	0	0
40	0	0	0	0	0	0	0	0	0	0	0	0
42	0	0	0	0	0	0	0.1	283.3	0	0	0	0
44	0.1	333.0	0	0	0	0	0	0	0	0	0	0
46	0	0	0.1	401.9	0	0	0	0	0	0	0	0
48	0	0	0.1	496.7	0	0	0	0	0.1	241.5	0	0
50	0	0	0.1	471.5	0	0	0	0	0	0	0	0
52	0	0	0	0	0	0	0.1	595.5	0	0	0.1	279.8
54	0	0	0	0	0	0	0	0	0.1	612.5	0	0
54+	0	0	0	0	0.2	4185.4	0	0	0	0	0	0
All Classes	65.4	14344.5	28.7	5866.0	9.2	6871.4	0.6	1544.6	0.4	1050.0	1.4	412.4

Table 17.—Mean numbers of trees and bd. ft. volumes per acre by species, diameter, and condition, Grouse Butte Unit

DBH	White Fir				Douglas-fir				Incense Cedar		Sugar Pine		Ponderosa Pine	
	Healthy		Root Diseased		Healthy		Root Diseased		Healthy		Healthy		Healthy	
Class	Trees/Acre	Vol./Acre	Trees/Acre	Vol./Acre	Trees/Acre	Vol./Acre	Trees/Acre	Vol./Acre	Trees/Acre	Vol./Acre	Trees/Acre	Vol./Acre	Trees/Acre	Vol./Acre
6	0	0	21.5	0	10.7	0	0	0	10.7	0	0	0	0	0
8	18.1	524.9	18.1	524.9	12.0	252.0	12.1	254.1	6.0	96.0	12.1	254.1	0	0
10	15.4	631.4	3.9	159.9	7.8	296.4	15.4	585.2	0	0	3.9	159.9	0	0
12	8.0	664.0	0	0	0	0	8.0	560.0	10.7	588.5	0	0	0	0
14	7.9	948.0	0	0	3.9	468.0	0	0	0	0	3.9	397.8	0	0
16	4.5	652.5	1.5	217.5	0	0	0	0	1.5	214.5	0	0	1.5	282.0
18	1.2	356.4	1.2	356.4	4.8	1470.0	1.2	312.0	0	0	0	0	0	0
20	1.9	769.5	1.0	405.0	3.9	1404.0	0	0	1.9	684.0	1.0	397.0	1.0	360.0
22	0	0	0.8	332.0	6.4	3366.4	0	0	0	0	0	0	0	0
24	1.3	612.3	0	0	1.3	838.5	0.7	451.5	0	0	0	0	0.7	329.7
26	0	0	0	0	0	0	0	0	0.6	454.2	0.6	390.6	0	0
28	0.5	443.7	0	0	0	0	0.5	371.5	0.5	355.0	0.5	476.5	0	0
30	0	0	0	0	0	0	0.9	1197.0	0.8	599.2	1.7	2147.1	0.4	532.0
32	0.4	512.4	0	0	0	0	0	0	0	0	1.1	1655.5	0	0
34	0	0	0	0	0	0	0	0	0	0	0	0	0	0
36	0.3	501.9	0	0	0	0	0	0	0.3	449.1	0	0	0	0
38	0	0	0	0	0	0	0	0	0.3	499.5	0.3	710.4	0	0
40	0	0	0	0	0.2	524.8	0	0	0.4	630.8	0	0	0	0
42	0	0	0	0	0	0	0	0	0.4	854.4	0	0	0	0
44	0	0	0	0	0	0	0	0	0	0	0	0	0	0
46	0	0	0	0	0	0	0	0	0	0	0	0	0	0
48	0	0	0	0	0	0	0	0	0.3	724.5	0	0	0	0
50	0	0	0	0	0	0	0	0	0	0	0.2	943.0	0	0
All Classes	59.5	6617.0	48.0	1995.7	51.0	8487.1	38.8	3731.3	34.4	12149.7	25.3	7531.9	3.6	1503.7

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